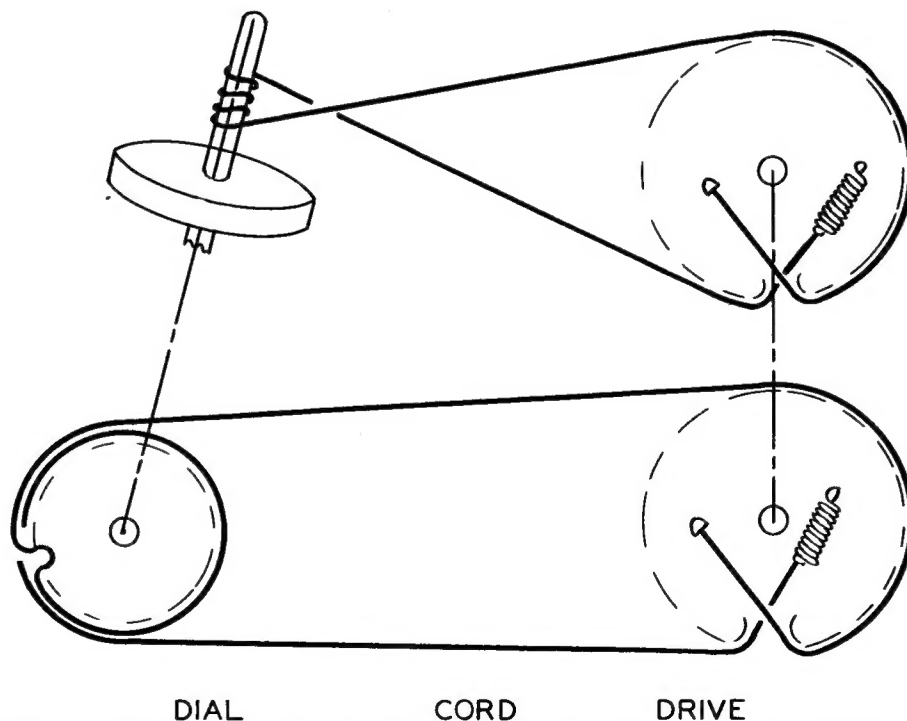


NATIONAL MODEL NC-33

TRADE NAME	National, Model NC-33
MANUFACTURER	National Co. Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC-DC Operated Multi-Band Commercial Type Superheterodyne Receiver
TUBES (SIX)	Types, 12SA7 Converter, 12SG7 IF Amp., 12H6 Det.-AVC-Noise Limiter, 12SL7GT AF Amp., -BFO, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-130 Volts AC-DC
TUNING RANGE-BROADCAST	500-1420KC
RATING	.22 Amp. @ 117 Volts AC
Bands "A"	-12.0-35.0MC, "B"-4.0-12.0MC, "C"-1.42-4.2MC



HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 7, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial con-

tent, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1948 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 10/48-#4817-14 SET #47-FOLDER #14

PARTS LIST AND DESCRIPTIONS TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		INSTALLATION NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT TYPE	
1	Converter	12SA7	12SA7	
2	IF Amp.	12SG7	12SG7	
3	Det.-AVC & Noise Lim.	12H6	12H6	
4	AF Amp. & BFO	12SL7GT	12SL7GT	
5	Power Output	35L6GT	35L6GT	
6	Rectifier	35Z5GT	35Z5GT	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REPLACEMENT DATA			IDENTIFICATION CODES AND INSTALLATION NOTES
		NATIONAL PART No.	AEROVOX PART No.	CORNEILL PART No.	
7A	40	AF88D		UF4415	EL-224* Filter
B	150				
8	10	FRSSO/10		BR105	TA-510 Output Cathode Bypass
9	50			BR105	TA-510 AF Cathode Bypass
10	10	484-1		DT4P1	TC-1 Line Filter
11	400	484-1		DT4P1	TC-1 Line Isolation
12	.03	684-03		DT6S3	TC-13 Output Plate Byp.-See Note
13	.1	484-1		DT4P1	TC-1 Noise Limiter Bias Filter
14	.01	484-01		DT4P1	TC-11 IF Screen Bypass
15	.1	484-1		DT4P1	TC-11 AVC Filter
16	.01	484-01		DT4P1	TC-1 Conv. Screen Bypass
17	.1	484-1		DT4P1	TC-1 AVC Filter
18	.1	484-1		DT4P1	TC-1 RF Bypass
19	.01	484-01		DT4P1	TC-11
20	.1	484-1		DT4P1	TC-11
21	10000	1441W-01		1D3S1	IFM-11 Audio Coupling
22	5000	1441W-005		1D3S5	IFM-25 AF Plate Bypass
23	2700	1468-0003		5W5T3	IFM-325 Fixed Trimmer
24	220	1469-0002		5R5T2	IFM-325 BFO Grid Cap.
25	270	1469-00025		5R5T25	IFM-325 BFO Coupling
26	10000	1441W-01		5W5T25	IFM-325 Diode RF Filter
27	270	1468-00025		5R5T5	IFM-35 Osc. Grid Coupling
28	10000	1441W-01			IFM-35 Osc. Grid Cap.
29	470	5000			Fixed Padder
30	4500	5000			"
31	1300	5000			"
32	510	5000			"
33	10000	5000			RF Bypass

*Parallel sections to obtain desired capacity.
Note-Some models use two capacitors in parallel to obtain the desired capacity.

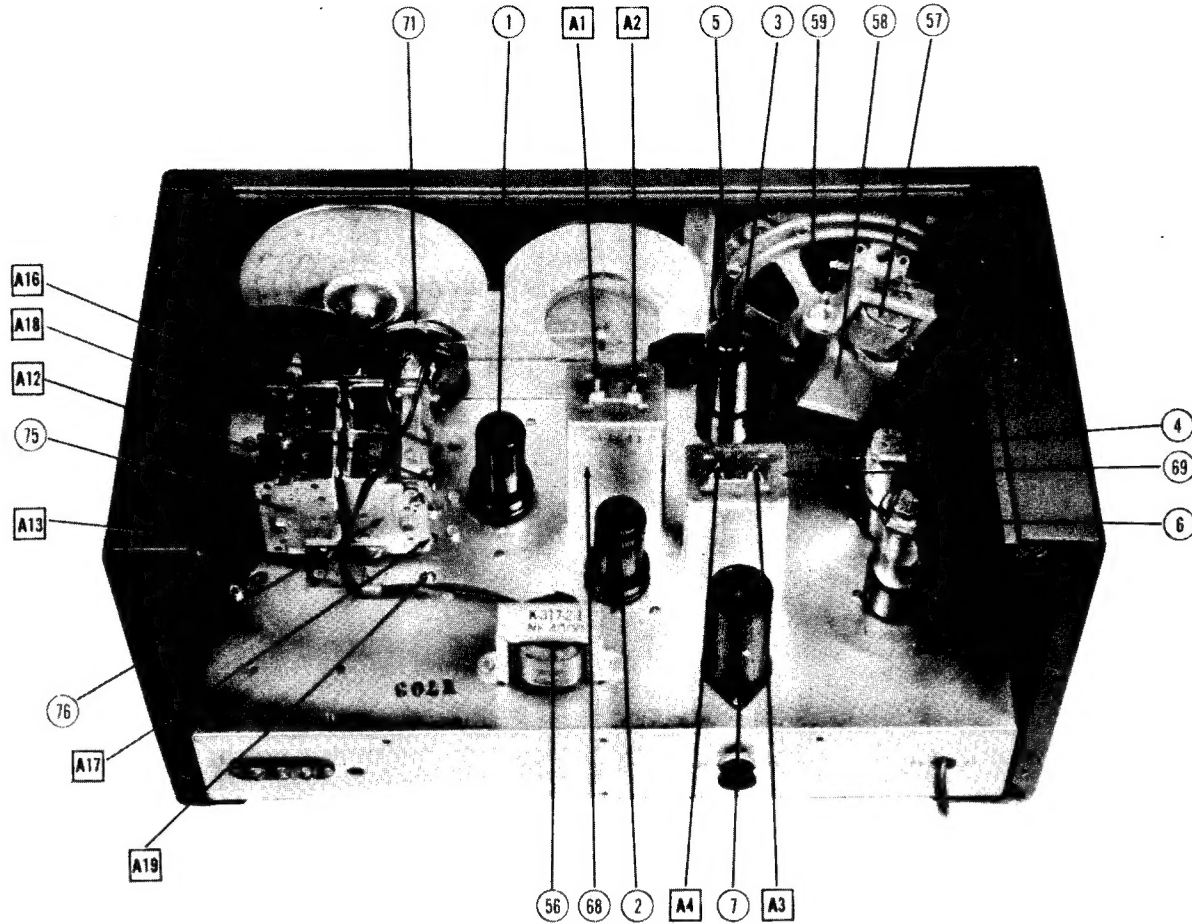
CONTROLS

ITEM No.	RATING	REPLACEMENT DATA		INSTALLATION NOTES
		NATIONAL PART No.	CLAROSTAT PART No.	
34A	500KΩ	D13-133	M-60-Z	AF Gain Control
B	Share		A	Not Req.
C	Switch		SW-A	Attach to 34A per Instructions

RESISTORS

ITEM No.	RATING	REPLACEMENT DATA		IDENTIFICATION CODES
		NATIONAL PART No.	IRC PART No.	
35	22KΩ		BTS-22K	Red-Red-Or. Osc. Grid
36	33KΩ			Or.-Or.-Blk. Parasitic Supp.
37	150Ω			Br.-Grn.-Br. Conv. Screen Decou.
38	1000Ω		BTS-1000	Red-Blk.-Red. AVC Network
39	2.2 Meg.		BTS-2.2 Meg.	Red-Red-Grn. IF Cathode
40	150Ω			Br.-Grn.-Br. IF Cathode
41	1000Ω		BTS-1000	Br.-Blk.-Red. Noise Limiter Bias Network
42	1 Meg.		BTS-1 Meg.	Br.-Blk.-Grn. " " " "
43	1 Meg.		BTS-1 Meg.	Red-Vi.-Yl. " " " "
44	270KΩ		BTS-270K	Yl.-Vi.-Yl. Diode Load
45	470KΩ			

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued) RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
46	2.2 Meg.		BTS-2.2 Meg.	Red-Red-Grn. AVC Network	
47	47KΩ		BTS-47K	Yl.-Vl.-Or. Filament Shunt	
48	47KΩ		BTS-47K	Yl.-Vl.-Or. BFO Plate Load	
49	1 Meg.		BTS-1 Meg.	Br.-Blk.-Grn. Bias Network	
50	3900Ω		BTS-3900	Or.-White-Red AF Cathode	
51	270KΩ		BTS-270K	Red-Vl.-Yl. AF Plate Load	
52	47KΩ		BTS-47K	Yl.-Vl.-Or. CWO Grid	
53	470KΩ		BTS-470K	Yl.-Vl.-Vl. Output Grid	
54	220Ω		BW-1-220	Red-Red-Br. Output Cathode	
55	820Ω		BTS-820	Gray-Red-Br. Dial Light Shunt	

FILTER CHOKE

ITEM No.	RATINGS		REPLACEMENT DATA		INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	NATIONAL PART No.	STANCOR PART No.	
56	.052A	215Ω	5.5 Henries	K-317-2-1	#Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING		REPLACEMENT DATA		INSTALLATION NOTES
	IMPEDANCE	DC RES.	NATIONAL PART No.	STANCOR PART No.	
57	2000Ω	3.4Ω	K-588-1	A-3876	T22845

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA		INSTALLATION NOTES
	FIELD	VC IMP.	NATIONAL PART No.	JENSEN PART No.	
58	PM	3.4Ω		87-107	
59	4-5/8"	9/16"		Mod. PS-V	5A15

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PHI.	SEC.	NATIONAL PART No.	MEISSNER PART No.
60	Ant. Coil D	2.6Ω	4.5Ω		
61	" " C	1Ω	1.7Ω		
62	" " B	0Ω	.8Ω		
63	" " A	0Ω	0Ω		
64	Osc. Coil D	1.8Ω	1.8Ω		
65	" " C	.1Ω	.1Ω		
66	" " B	"	"		
67	" " A	"	"		
68	Input IF	7.2Ω	7.5Ω	16-5740	
69	Output IF	7.7Ω	7.8Ω	16-5742	
70	BFO Coil		4.8Ω		

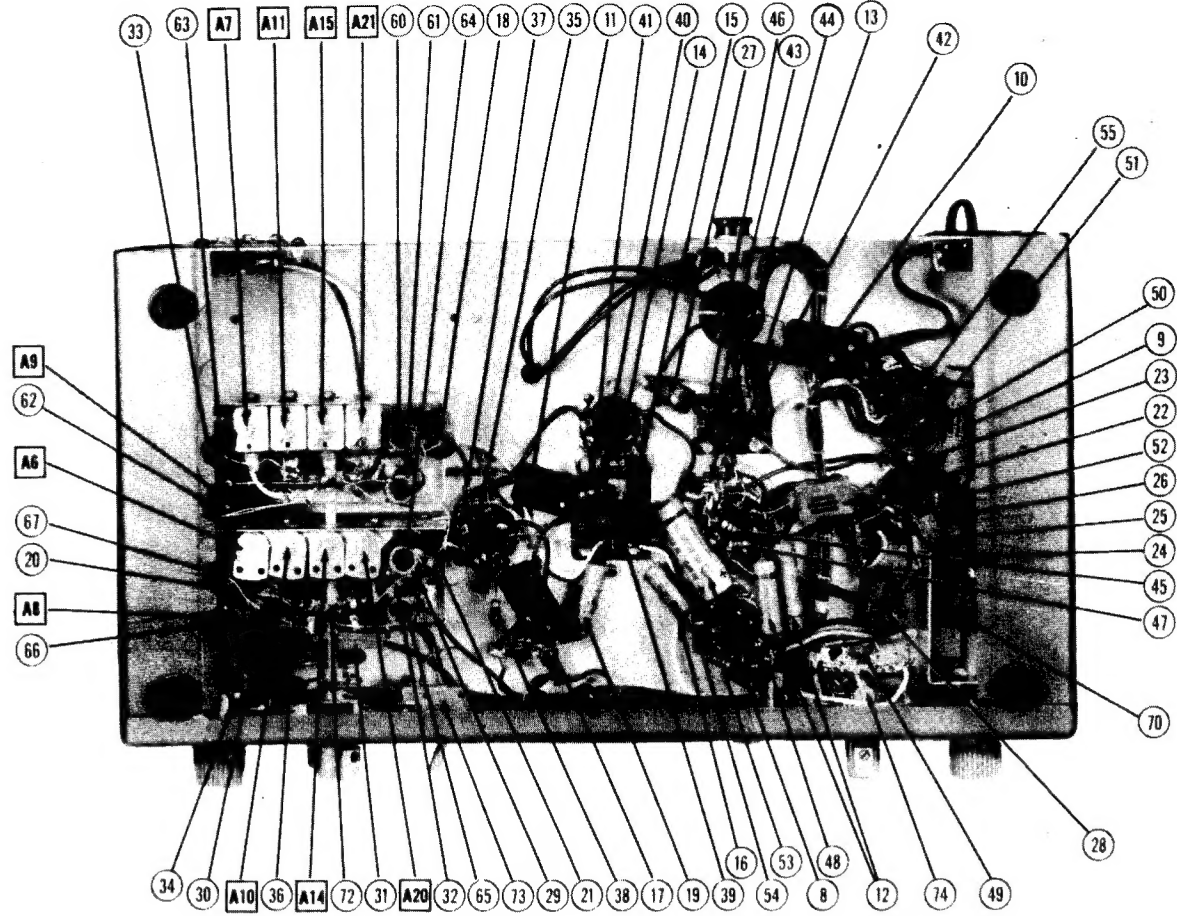
DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	REPLACEMENT DATA		INSTALLATION NOTES
				BEAD COLOR	NATIONAL PART No.	
71	Bayonet	8-8	0.15	Brown		Type 47

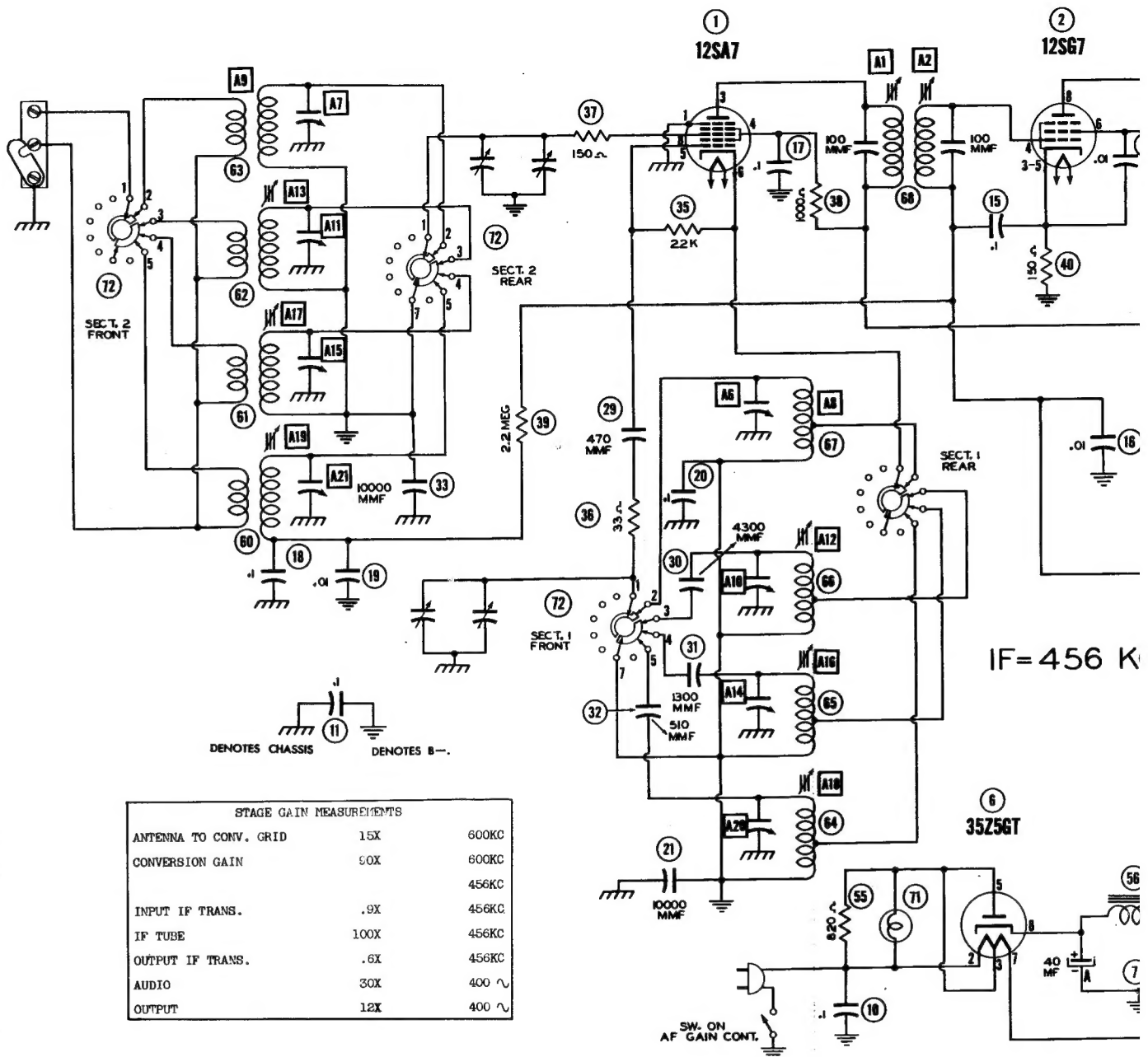
MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
72	Switch		Band
73	"		Send-Receive
74	"		OK-Phone-ANL
75	Main Tuning Gage		
76	Bandspread Gage		

CHASSIS—BOTTOM VIEW



ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT							
To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial. Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-. Set AF gain control at maximum, "Send-Rec" switch at rec., reception switch to phone, pitch control to midscale and bandsread dial to "set", except where otherwise noted. Output of sig. gen. should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for all adjustments.							
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 Direct	Across antenna terminals "A", with link disconnected.	456KC	Band "D"	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2 Direct	"	456KC (Unmodulated)	"	"	"	A5	Reception switch to "CW". Loosen set screw on pitch control shaft and remove knob and shaft. Adjust A5 for zero beat. Replace shaft and knob so that white dot is at midscale. Place set screw directly opposite stop and tighten.
3 300Ω carbon res.	High side to either ant. terminal. Low side to other ant. terminal with link disconnected.	34MC	Band "A"	34MC	Across voice coil	A6	Adjust for maximum output. Check for image by tuning sig. gen. to 33.09MC. If signal is not heard retune sig. gen. to 34MC and close A6 to next peak. Adjust for maximum output and recheck for image.
4 "	"	"	"	Tune for maximum output.	"	A7	Rock tuning cap. and adjust for maximum output.
5 "	"	12MC	"	12MC	"	A8,A9	Adjust for maximum output. Repeat Steps 3, 4 and 5 until no further improvement can be made.
6 "	"	11MC	Band "B"	11MC	"	A10	Adjust for maximum output. Check for image by tuning sig. gen. to 11.91MC. If signal is not heard, retune sig. gen. to 11MC and open A10 to next peak. Adjust for maximum output and recheck for image.
7 "	"	"	"	Tune for maximum output.	"	A11	Rock tuning cap. and adjust for maximum output.
8 "	"	4MC	"	4MC	"	A12, A13	Adjust for maximum output. Repeat Steps 6, 7 and 8 until no further improvement can be made.
9 "	"	"	Band "C"	"	"	A14	Adjust for maximum output. Check for image by tuning sig. gen. to 4.91MC. If signal is not heard retune sig. gen. to 4MC and open A14 to next peak. Adjust for maximum output and recheck for image.
10 "	"	"	"	Tune for maximum output.	"	A15	Rock tuning cap. and adjust for maximum output.
11 "	"	1.5MC	"	1.5MC	"	A16, A17	Band spread dial to "0". Adjust A16&A17 for max out. Repeat Steps 9, 10 & 11 until no further improvement can be made.
12 "	"	500KC	Band "D"	500KC	"	A18, A19	Bandsread to "0". Adjust A18 and A19 for maximum output. Return bandsread dial to "Set".
13 "	"	1400KC	"	1400KC	"	A20	Adjust for maximum output. Check for image by tuning sig. gen. to 2.31MC. If signal is not heard, retune sig. gen. to 1400KC and open A20 to next peak. Adjust for maximum output and recheck for image.
14 "	"	"	"	Tune for maximum output.	"	A21	Rock tuning cap. and adjust for maximum output. Repeat Steps 12, 13 and 14 until no further improvement can be made.



STAGE GAIN MEASUREMENTS		
ANTENNA TO CONV. GRID	15X	600KC
CONVERSION GAIN	50X	600KC
INPUT IF TRANS.	.9X	456KC
IF TUBE	100X	456KC
OUTPUT IF TRANS.	.6X	456KC
AUDIO	30X	400 ~
OUTPUT	12X	400 ~

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	25VAC	115VDC	105VDC	-9.8VDC§	0V.	40VAC	-.2VDC
2	12SG7	0V.	55VAC	1.2VDC	-.1VDC	1.2VDC	110VDC	40VAC	115VDC
3	12H6	0V.	14VAC	-.1VDC	-.1VDC	-.2VDC	0V.	25VAC	0V.
4	12SL7GT	0V.	50VDC	1VDC	-2.8VDC§	75VDC	0V.	14VAC	0V.
5	35L6GT	0V.	90VAC	110VDC	115VDC	0V.	0V.	55VAC	7.8VDC
6	35Z5GT	0V.	117VAC	115VAC	0V.	115VAC	115VDC	90VAC	125VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER.

§ TAKEN WITH "CW-PHONE-ANL" SWITCH IN "ANL" POSITION.
TAKEN IN CW POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY
ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

- DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
- Socket connections are shown as bottom views.
- Measured values are from socket pin to common negative.
- Line voltage maintained at 117 volts for voltage readings.
- Nominal tolerance on component values makes possible a variation of $\pm 10\%$ in voltage and resistance readings.
- Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFAC STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1948

